GPGPU Parallel SPIN Model Checker

Completed Technology Project (2012 - 2016)

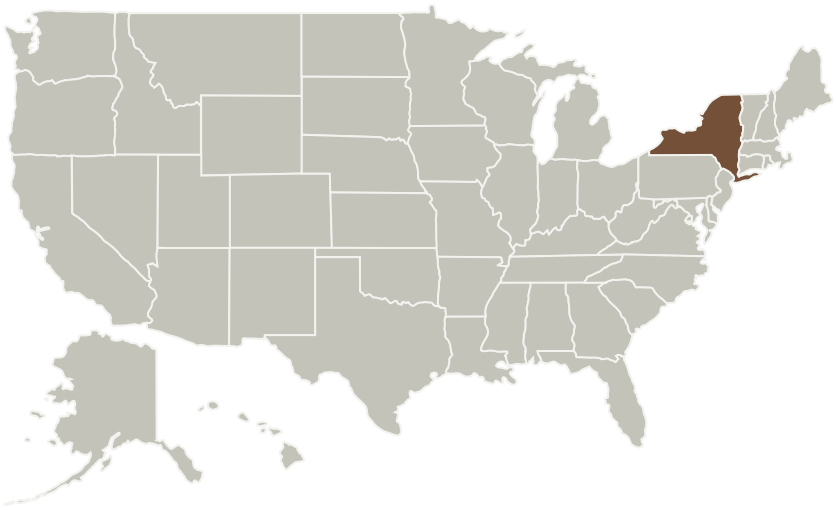
Project Introduction

Model Checking is a powerful technique used to verify that a system does not violate its intended behavior. While this is very useful in proving the robustness of a system, one drawback is that as the system grows in complexity or the number of properties being checked increases the time it takes to complete the model checking process grows exponentially larger. General-Purpose computing on Graphics Processor (GPGPU) architecture allows for programs to be rapidly executed on thousands of threads as a cheap alternative to supercomputing clusters. The goal of this project is to utilize CUDA and OpenCL GPGPU frameworks in order to parallelize the SPIN model checker to the greatest extent possible.

Anticipated Benefits

General-Purpose computing on Graphics Processor (GPGPU) architecture allows for programs to be rapidly executed on thousands of threads as a cheap alternative to supercomputing clusters. The goal of this project is to utilize CUDA and OpenCL GPGPU frameworks in order to parallelize the SPIN model checker to the greatest extent possible.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Stony Brook University	Supporting Organization	Academia	Stony Brook, New York

Project Image GPGPU Parallel SPIN Model Checker

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Space Technology Research Grants

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Primary U.S. Work Locations

New York

Images

11486-1363184770401.jpg
Project Image GPGPU Parallel SPIN Model Checker
(https://techport.nasa.gov/image/1767)

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:
Claudia M Meyer

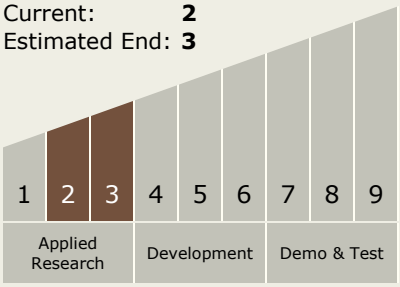
Program Manager:
Hung D Nguyen

Principal Investigator:
Scott Smolka

Co-Investigator:
Richard J Defrancisco

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.1 Software Modeling and Model Checking